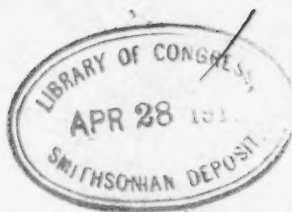


PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

VOL. XXXVII—No. 4

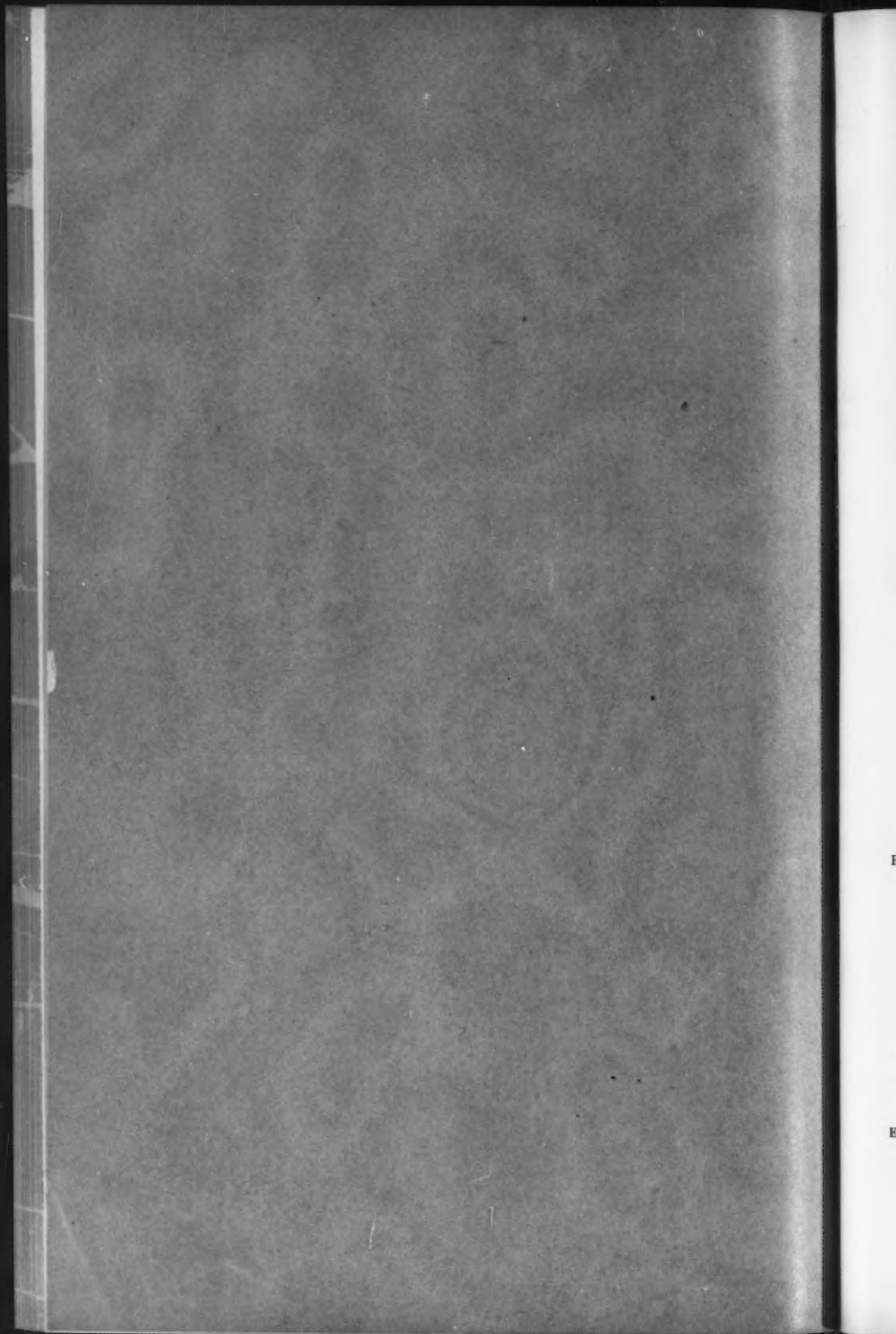


April, 1911



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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS
(INSTITUTED 1852)

VOL. XXXVII—No. 4

APRIL, 1911

Edited by the Secretary, under the direction of the Committee on Publications.

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NEW YORK 1911.

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American Society of Civil Engineers

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ON BITUMINOUS MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....5913 Columbus.
CABLE ADDRESS....."Ceas, New York."

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed
in its publications.

SOCIETY AFFAIRS

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MINUTES OF MEETINGS OF THE SOCIETY

March 15th, 1911.—The meeting was called to order at 8.30 P. M.; President Mordecai T. Endicott in the chair; Chas. Warren Hunt, Secretary; and present, also, 109 members and 15 guests.

A paper by Arnold C. Koenig, Assoc. M. Am. Soc. C. E., entitled "Dams on Sand Foundations: Some Principles Involved in Their Design, and the Law Governing the Depth of Penetration Required for Sheet-Piling," was presented by the Secretary, who also read communications on the subject from Messrs. W. G. Price and Alexander Potter. The paper was discussed orally by T. Kennard Thomson, M. Am. Soc. C. E.

The Secretary announced the following deaths:

ALBERT VICTOR KELLOGG, elected Associate Member, November 6th, 1895; died February 15th, 1911.

TAKEJIRO SHIMA, elected Associate Member, March 4th, 1903; died in December, 1910. (Exact date not known.)

Adjourned.

April 5th, 1911.—The meeting was called to order at 8.30 p. m., President Endicott in the chair; Chas. Warren Hunt, Secretary; and present, also, 80 members and 8 guests.

The minutes of the meetings of February 15th and March 1st, 1911, were approved as printed in *Proceedings* for March, 1911.

A paper entitled "The Going Value of Water-Works," by Leonard Metcalf and John W. Alvord, Members, Am. Soc. C. E., was presented by Mr. Metcalf. Written communications on the subject by Messrs. Clinton S. Burns, Albert I. Frye, and Frederic P. Stearns were read by the Secretary, and the paper was discussed orally by Messrs. E. Kuichling and Leonard Metcalf.

Robert B. Stanton, M. Am. Soc. C. E., requested permission to address the meeting with reference to the fire risks in the New York Public Library, and asserted that the danger of fire is increased on account of the quantities of wood in the ceilings, wainscoting, furniture, etc., of the building.

The Secretary announced the election of the following candidates on April 4th, 1911:

AS MEMBERS.

TIMOTHY RALPH ATKINSON, Bismarck, N. Dak.
NATHANIEL ALLEN CARLE, Seattle, Wash.
ROLLA CLINTON CARPENTER, Ithaca, N. Y.
CHRISTOPHER JAMES CARVEN, Dorchester Centre, Mass.
THOMAS HAMILTON COE, Worcester, Mass.
JOHN MEIGS, Philadelphia, Pa.
GEORGE ALFRED NELSON, Lowell, Mass.
DAVID KIRK ORR, Brownsville, Pa.
SHEPARD BROWN PALMER, Norwich, Conn.
EDWARD SCHILDHAUER, Culebra, Canal Zone, Panama.
ALLISON JAMES WHARF, Cheyenne, Wyo.

AS ASSOCIATE MEMBERS.

CLARENCE RAYMOND ANDREW, Wellsburg, W. Va.
GEORGE CLYDE BALDWIN, Salt Lake City, Utah.
CHARLES BERNARD BUEGER, Philadelphia, Pa.
ARTHUR FRANCIS COMSTOCK, Buffalo, N. Y.
WILLIAM HENRY CONNELL, New York City.
RAY DE FOREST COOPER, Burns, Ore.
SPENCER VAN ZANDT CORTELYOU, Los Angeles, Cal.
BURGIS GREENACRE COY, Fort Collins, Colo.
MOTT V DODGE, Burns, Ore.
MAURICE OWEN ELDRIDGE, Washington, D. C.
WILLIAM HENRY GRAVELL, Philadelphia, Pa.
JOHN MILLER HAMMOND, Kansas City, Mo.

EDWARD PIERSON HENDRICK, Boston, Mass.
STUART WILSON JACKSON, Wellsboro, Pa.
JOSEPH FRANCIS KERN, White Plains, N. Y.
JOHN JENNINGS KINGMAN, Washington, D. C.
GUY VINCENT MCCLURE, Oklahoma City, Okla.
JAMES LEO MURPHY, New York City.
VINCENT PHILLIP ODONI, Denver, Colo.
GEORGE HENRY PRESTON, New York City.
ALLAN JOHN WAGNER, East Oakland, Cal.
HARRY ARTHUR WEEKS, Albany, N. Y.
ISRAEL VERNON WERBIN, New York City.
WESLEY AKERS WYNN, Warren, Pa.

AS ASSOCIATES.

CHARLES ERNEST GOAD, Toronto, Ont., Canada.
JOHN WILLIAM MILLER, Seattle, Wash.

AS JUNIORS.

BERNARD JOSEPH BLEISTEIN, Astoria, N. Y.
ALOYSIUS HENRY DOERING, Martins Ferry, Ohio.
ROBERT SAMUEL FURBER, Brooklyn, N. Y.
RAYMOND CLINTON KELLOGG, New York City.
HARRY MILTON LYNDE, Walden, N. Y.
ROGER LEROY MORRISON, Champaign, Ill.
JOSEPH PRICE, Providence, R. I.
THEODORE JOHN SCHMIDT, Red Oak, Iowa.
HOMER J SHARP, Long Beach, Cal.
JAMES ALFRED SILSBEE, Denver, Colo.
EDWARD CHARLES STOCKER, Boulder, Colo.
DOUGLAS STANLEY TROWBRIDGE, New York City.
WILLIAM HAROLD WARNOCK, Poughkeepsie, N. Y.

The Secretary announced the transfer of the following candidates
on April 4th, 1911:

FROM ASSOCIATE MEMBER TO MEMBER.

CHARLES METCALF ALLEN, Worcester, Mass.
CHARLES BLANEY BREED, Boston, Mass.
ALFRED ELLSWORTH CARTER, New York City.
VICTOR KING HENDRICKS, St. Louis, Mo.
NED HERBERT JANVRIN, Newburgh, N. Y.
ALBERT HENRY PERKINS, Albany, N. Y.
JOHN WARE, Cambridge, Mass.

FROM JUNIOR TO ASSOCIATE MEMBER.

LE ROY WALTER CLARK, Troy, N. Y.

FREDERICK HALL FOWLER, San Francisco, Cal.

PHILIP DAKIN GILLHAM, Buffalo, N. Y.

WESLEY WINANS HORNER, St. Louis, Mo.

CHARLES TILESTON LEEDS, Los Angeles, Cal.

WARREN BROWN THOMSON, Springfield, Mass.

The Secretary announced the following deaths:

GEORGE BOWERS CALDWELL, elected Member April 1st, 1908; died March 31st, 1911.

IRVING HAWKINS, elected Associate Member May 6th, 1908; died March 14th, 1911.

JAVIER DIAZ LOMBARDO, elected Associate Member October 2d, 1907; died March 22d, 1911.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

April 4th, 1911.—President Endicott in the chair; Chas. Warren Hunt, Secretary; and present, also, Messrs. Belknap, Bensel, Boller, Clarke, Kimball, Loomis, Loweth, Ridgway, Roberts, Snow, Stott, Talbot, Thompson, and Wilkins.

The territory occupied by the membership was divided into seven geographical districts as prescribed in Article VII, Section 1 of the Constitution.*

The proposition for the appointment of a Special Committee to formulate principles and methods for the valuation of railroad property and other public utilities, which was referred to the Board by the Annual Meeting, was considered, as provided in Article VI, Section 12.

The Board decided to appoint such Committee, and appointed a Subcommittee to suggest the personnel of such Committee to the next meeting of the Board.

Committees of Arrangements for the Annual Convention were appointed.†

Director Edward Flad was appointed a member of the Library Committee.

Ballots for membership were canvassed, resulting in the election of 11 Members, 24 Associate Members, 2 Associates, and 13 Juniors, and the transfer of 6 Juniors to the grade of Associate Member.

Seven Associate Members were transferred to the grade of Member.

Applications were considered, and other routine business transacted.

Adjourned.

* These subdivisions are given on page 212.

† See page 211.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

May 3d, 1911.—8.30 P. M.—A regular business meeting will be held, and a paper by John P. Hogan, Jun. Am. Soc. C. E., entitled "Sinking a Wet Shaft," will be presented for discussion.

This paper was printed in *Proceedings* for March, 1911.

May 17th, 1911.—8.30 P. M.—A paper by Charles Arthur Hague, M. Am. Soc. C. E., entitled "The Present-Day Pumping Engine for Water-Works," will be presented for discussion.

This paper was printed in *Proceedings* for March, 1911.

June 7th, 1911.—8.30 P. M.—This will be a regular business meeting. Two papers will be presented for discussion, as follows: "Two Earth Dams of the United States Reclamation Service," by D. C. Henny, M. Am. Soc. C. E.; and "Steel Centering Used in the Construction of the Rocky River Bridge, Cleveland, Ohio," by Wilbur J. Watson, M. Am. Soc. C. E.

These papers are printed in this number of *Proceedings*.

ANNUAL CONVENTION

The Forty-third Annual Convention of the Society will be held at Chattanooga, Tenn., June 13th to 16th, 1911, inclusive.

As soon as possible a circular giving information as to the general programme, transportation, hotel rates, etc., will be issued.

Arrangements for the Convention are in the hands of the following Committees:

Committee of the Board of Direction

HUNTER McDONALD, *Chairman*

WILLIAM E. BELKNAP

CHAS. WARREN HUNT

Local Committee

WILLIAM DUNBAR JENKINS, *Chairman*

E. E. BETTS

W. M. GARDNER

H. S. BOSLER

W. H. COURTENAY

W. H. CONVERSE

J. W. KENDRICK

J. A. FAIRLEIGH

J. N. HAZLEHURST

C. H. FISK

T. G. DABNEY

D. H. WOOD

W. S. LEE

W. W. HARTS

J. E. SIRRINE

W. W. CARSON

GEORGE F. ROWELL

W. F. REICHARDT

GEOGRAPHICAL SUB-DIVISIONS

At its meeting, April 4th, 1911, the Board of Direction divided the territory occupied by the membership into seven geographical districts, as provided in Article VII, Section 1 of the Constitution, and announces such division as provided in said section.

District No. 1.—The territory within 50 miles of the Post-Office in the City of New York.

District No. 2.—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut (except as included in District No. 1), Alaska, Canada, Europe, and Africa.

District No. 3.—New York and New Jersey (except as included in District No. 1), Michigan, Wisconsin, and Minnesota.

District No. 4.—Pennsylvania, Delaware, Maryland, Ohio, and the District of Columbia.

District No. 5.—North Dakota, South Dakota, Nebraska, Kansas, Iowa, Missouri, Illinois, Indiana, and Kentucky.

District No. 6.—Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, Texas, New Mexico, Arizona, Mexico, the West India Islands, Central America, and South America.

District No. 7.—Montana, Wyoming, Colorado, Idaho, Utah, Washington, Oregon, California, Nevada, Hawaii, Asia, and Australasia.

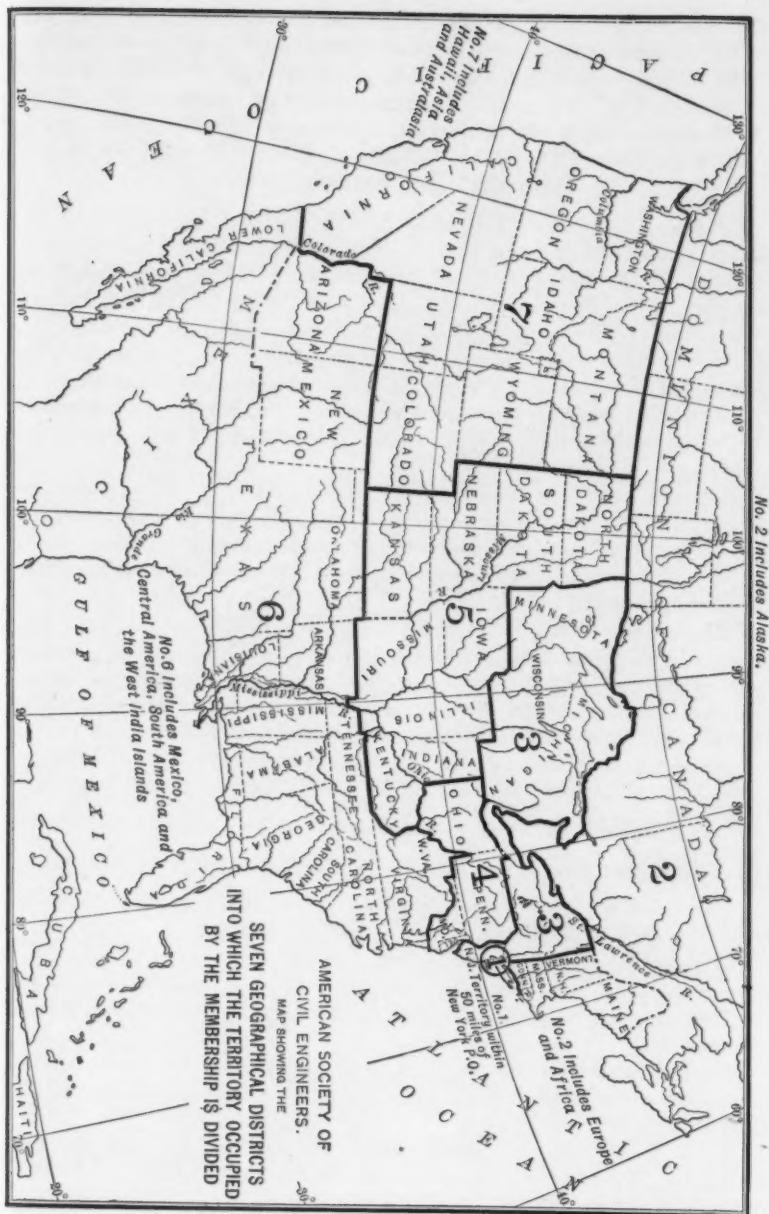
SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members, who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that, if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general



books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In reference to this work, the Appendices* to the Annual Reports of the Board of Direction for the years ending December 31st, 1906, and December 31st, 1910, contain summaries of all searches made to date.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussions of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*. The issue of volumes of *Transactions* is dependent on the closing of discussions, and the co-operation of the membership in this matter is essential to the regular issue of each quarterly volume.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and, on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which, from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions, only, will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

SUBSCRIPTION PRICE TO THE PUBLICATIONS OF THE SOCIETY.

The following subscription rates have been fixed by the Board of Direction for the publications of the Society:

Proceedings, ten Numbers per annum, \$8. Price for single numbers, \$1.

Transactions, four Volumes per annum, \$12. Price for single volumes, \$4.

On the above prices there is a discount of 25% to members who desire extra copies of any of these publications, to Libraries, and to Book-dealers.

There is also an additional charge per annum, to cover foreign postage, of 75 cents for *Proceedings* and \$1 for *Transactions*, or 8 cents and 25 cents, respectively, for single numbers.

* *Proceedings*, Vol. XXXIII, p. 20 (January, 1907); Vol. XXXVII, p. 28 (January, 1911).

A special subscription rate has been fixed by the Board for the *Proceedings* of the Society for the benefit of Students in Technical Schools. This rate is \$4.50 per annum, and is available to any *bona fide* student of any technical school.

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., M. Am. Soc. C. E., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any member of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest of the Association at any of the above meetings, if he will notify the Secretary that he is in San Francisco.

(Abstract of Minutes of Meeting)

February 17th, 1911.—The meeting was called to order; President Derleth* in the chair; E. T. Thurston, Jr., Secretary; and present, also, 75 members and guests.

The President delivered his Inaugural Address, which was ordered printed and distributed.

The question of choosing a site for the Panama-Pacific Exposition, with special reference to the proposed water-front site as advocated by Senator Newlands of Nevada, was introduced by Luther Wagoner, M. Am. Soc. C. E., and, on motion, the President was authorized to appoint a committee of five to consider the question, with power to act in conjunction with the Board of Directors.

A general outline of the work accomplished on the various projects of the United States Reclamation Service, with special reference to the construction of reservoirs, dams, and canals, including data as to costs, was presented by Thomas H. Means, M. Am. Soc. C. E., who illustrated his remarks with lantern slides.

Adjourned.

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers are held on the second Saturday of each month, except July and August. The hour and place of meet-

*Charles Derleth, Jr., M. Am. Soc. C. E., was elected President of the San Francisco Association on December 16th, 1910. Through an error another name than Mr. Derleth's was inserted as such on page 170 of *Proceedings* for March, 1911.

ing are not fixed, but this information will be furnished on application to the Secretary, Gavin N. Houston, M. Am. Soc. C. E., 409 Equitable Building, Denver, Colo. The meetings are usually preceded by an informal dinner. Members of the American Society of Civil Engineers will be welcomed at these meetings.

Weekly luncheons are held on Wednesdays, and until further notice, will take place at The Colorado Traffic Club.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meeting)

March 11th, 1911.—The meeting was called to order; Vice-President C. W. Comstock in the chair; G. N. Houston, M. Am. Soc. C. E., acting as Secretary; and present, also, 12 members and 3 guests.

A paper by W. R. Lewis, Assoc. M. Am. Soc. C. E., entitled "The Trinidad Water-Works and the Cost of a Booster Station," was presented by the author, and the subject was discussed informally by a number of those present.

Adjourned.

**PRIVILEGES OF ENGINEERING SOCIETIES
EXTENDED TO MEMBERS OF THE
AMERICAN SOCIETY OF CIVIL ENGINEERS**

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms and at all Meetings:

American Institute of Mining Engineers, 29 West Thirty-ninth Street,
New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66,
Germany.

Associação dos Engenheiros Cíveis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria,
Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston,
Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 413 Dorchester Street, West,
Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, St. Paul, Minn.

Cleveland Engineering Society, 718 Caxton Building, Cleveland,
Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Dansk Ingeniørforening, Amaliegade 38, Copenhagen, Denmark.

Engineers' and Architects' Club of Louisville, Ky., 303 Norton
Building, Fourth and Jefferson Streets, Louisville, Ky.

Engineers' Club of Baltimore, Baltimore, Md.

- Engineers' Club of Minneapolis**, 17 South Sixth Street, Minneapolis, Minn.
- Engineers' Club of Philadelphia**, 1317 Spruce Street, Philadelphia, Pa.
- Engineers' Club of St. Louis**, 3817 Olive Street, St. Louis, Mo.
- Engineers' Club of Toronto**, 96 King Street, West, Toronto, Ont., Canada.
- Engineers' Society of Pennsylvania**, 219 Market Street, Harrisburg, Pa.
- Engineers' Society of Western Pennsylvania**, 2511 Oliver Building, Pittsburg, Pa.
- Institute of Marine Engineers**, 58 Romford Road, Stratford, London, E., England.
- Institution of Engineers of the River Plate**, Buenos Aires, Argentine Republic.
- Institution of Naval Architects**, 5 Adelphi Terrace, London, W. C., England.
- Junior Institution of Engineers**, 39 Victoria Street, Westminster, S. W., London, England.
- Koninklijk Instituut van Ingenieurs**, The Hague, The Netherlands.
- Louisiana Engineering Society**, 321 Hibernia Bank Building, New Orleans, La.
- Memphis Engineering Society**, Memphis, Tenn.
- Midland Institute of Mining, Civil and Mechanical Engineers**, Sheffield, England.
- Montana Society of Engineers**, Butte, Montana.
- North of England Institute of Mining and Mechanical Engineers**, Newcastle-upon-Tyne, England.
- Oesterreichischer Ingenieur- und Architekten-Verein**, Eschenbachgasse 9, Vienna, Austria.
- Pacific Northwest Society of Engineers**, 803 Central Building, Seattle, Wash.
- Rochester Engineering Society**, Rochester, N. Y.
- Sachsischer Ingenieur- und Architekten-Verein**, Dresden, Germany.
- Sociedad Colombiana de Ingenieros**, Bogota, Colombia.
- Sociedad de Ingenieros del Peru**, Lima, Peru.
- Societe des Ingenieurs Civils de France**, 19 Rue Blanche, Paris, France.
- Society of Engineers**, 17 Victoria Street, Westminster, S. W., London, England.
- Svenska Teknologforeningen**, Brunkebergstorg 18, Stockholm, Sweden.
- Tekniske Forening**, Vestre Boulevard 18-1, Copenhagen, Denmark.
- Western Society of Engineers**, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From March 7th to April 10th, 1911)

DONATIONS *

STANDARD PRACTICAL PLUMBING.

By R. M. Starbuck. Cloth, $9\frac{1}{2} \times 6\frac{1}{2}$ in., illus., 406 pp. New York, The Norman W. Henley Publishing Company, 1910. \$3.00.

In a secondary title it is stated that this book is an exhaustive treatise on all branches of plumbing construction, including drainage and venting, ventilation, hot and cold water supplies, and circulation, and that special attention has been given to the theory underlying plumbing devices and operations. As the book is intended for instruction as well as reference, it has been the author's aim to make the contents as comprehensive as possible. In Chapters I to IV, he discusses briefly the manual work of the plumber. This is followed, in Chapters V to XVII, by descriptions of the various phases of trapping, venting, and drainage. Chapters XVIII to XXI are devoted to the important classes of plumbing construction, and Chapters XXII to XXXIII are given up to a general discussion of the subject of hot and cold water supply. There is also a chapter on mechanical drawing, especially designed for the plumber, and an index.

MOTION STUDY.

A Method for Increasing the Efficiency of the Workman. By Frank B. Gilbreth. With an Introduction by Robert Thurston Kent. Cloth, $8 \times 5\frac{1}{2}$ in., illus., 23 + 116 pp. New York, D. Van Nostrand Company, 1911. \$2.00.

The subject-matter contained in this book was first published serially in *Industrial Engineering*, and is stated to be a study of the conditions governing the number of motions made by workmen, the methods for reducing such motions, and the various influences bearing on the subject, such as physique, race, creed, nationality, early training, nutrition, home surroundings, tools, appliances, etc. While the examples and illustrations used have been drawn from one line of work, namely, brick-laying, the application of the principles outlined to work of every character is stated to be clearly indicated by the author. The Contents are: Introduction; Description and General Outline of Motion Study; Variables of the Worker; Variables of the Surroundings; Variables of the Motion; Past, Present and Future of Motion Study; Index.

SMOLEY'S TABLES.

Parallel Tables of Logarithms and Squares, etc., for Engineers, Architects, and Students. By Constantine Smoley, Assoc. M. Am. Soc. C. E. Sixth Edition, Revised and Enlarged. Leather, 7×5 in., illus., 329 + 171 pp. New York, The Engineering News Publishing Company. London, Archibald Constable & Co., Ltd., 1911. \$3.50.

This edition was planned, it is stated, to cover a larger field of theoretical as well as practical work. This plan necessitated the extension, in the second part—the Logarithmic-Trigonometric Tables—of the Table of Natural Functions to give the sine, cosine, tangent, cotangent, secant, and cosecant by intervals of one minute, and the addition of tables of Squares, Cubes, Square Roots, Cube Roots, and Reciprocals of numbers from 1 to 1000, as well as tables of Area and Circumferences of Circles with diameters from 1 to 1000. The Contents are: Part I, Parallel Tables of Logs. and Squares; Table of Bevels; Multiplication Table; Explanations and Examples; Constants; Decimal Equivalent. Part II, Logarithms of Numbers; Log. Functions by $10''$; Angles between 0° and 1° ; Log. Functions by $1'$; Natural Functions; Squares, Cubes, etc.; Formulas; Decimal Equivalents, Constants.

CONCRETE WALL FORMS.

By A. A. Houghton. Paper, $7\frac{1}{2} \times 5$ in., illus., 62 pp. New York, The Norman W. Henley Publishing Co., 1910. 50 cents.

This is the first of a series of books on various successful methods of concrete construction. This volume is stated to be a practical treatise on all types of

* Unless otherwise specified, books in this list have been donated by the publishers.

wall forms, clamps, separators, and spacers for reinforcement, and the author has endeavored to explain every part of the subject in the plainest language and from the viewpoint of the worker. Full details and working drawings of an automatic wall clamp are given, together with an explanation of the operation of the same on all styles of walls. The treatment of foundations, retaining walls, the placing of floor-joints, the moulding of water-tables and window ledges, as well as the moulding of fireproof walls and the preparation of foundations for concrete walls, are stated to be fully discussed. The Chapter Headings are: Bracing Wall Forms; Foundations for Walls; Constructing Footing Courses; Strength and Weight of Concrete; Easily Made Clamps, Wire Ties, and Separators; Use of Metal Forms for Concrete Walls; Constructing an Automatic Clamp for Wall Forms; Operating and Adjusting Clamp to all Widths of Wall; The Best Method of Placing Floor-Joists; Placing Door and Window Frames and Marking Wall into Blocks; Moulding Window Ledge and Projecting Ornaments with Wall; Spacer for Reinforcement; Moulding Concrete Furring Strips to Make a Fireproof Wall; An Economical System of Constructing Walls; Joining Sections of Wall and Bonding Concrete with Acids; Retaining Walls; Index.

CONCRETE FLOORS AND SIDEWALKS.

By A. A. Houghton. Paper, $7\frac{1}{2}$ x 5 in., illus., 63 pp. New York, The Norman W. Henley Publishing Co., 1910. 50 cents.

The author states that this volume is a practical treatise on the subject of moulding concrete floors and sidewalks with both plain and ornamental surfaces. The work of construction is taken up in regular progression, the essential points on foundations and the placing of forms being discussed, together with materials for proper proportioning and mixing, placing and tamping, size of slab joints, and finishing of surfaces. Illustrations and descriptions are also given of the methods and materials to be used in moulds for diamond, hexagonal, and octagonal floor tile, as well as the construction of reinforced hollow concrete floor slabs, interlocking floor units, and the reinforcement of floors and walks. The Contents are: Causes of Defective Floors; Foundations; Constructing Forms and Thickness of Slabs; Materials for Good Concrete; Proportioning and Mixing; Placing and Tamping the Concrete; Size of Slabs and Expansion Joints; Placing and Finishing Surface; Tools for Finishing Floors and Walks; Metal Forms for Expansion Joints; Machine to Mould Curb and Gutter; How to Prevent Defects in Work; Curing the Work; Cost of the Work; Ornamental Surfaces for Floors and Walks; Moulds for Mosaic Floor Tile; Materials and Colors for Surfaces; Moulds for Hexagonal Blocks and Tile; Laying Concrete Floor Tile; Moulding Hollow Concrete Floor Slabs; Interlocking Floor Slabs; Adjustable Brace for Shoring; Reinforcing Floors and Slabs; Index.

ELECTRIC MOTORS.

Continuous, Polyphase, and Single-Phase Motors: Their Theory and Construction. By Henry M. Hobart. Second Edition, Rewritten, Revised, and Enlarged. Cloth, 9 x 6 in., illus., 24 + 748 pp. New York, The Macmillan Company; London, Whitaker & Co., 1910. \$5.50.

The subject-matter of this volume has been divided into three parts, namely, Continuous Motors, Polyphase Motors, and Single-Phase Motors, and includes their design and construction, together with examples of the various types described. This edition, while omitting many of the older designs included in the first edition, has been greatly enlarged by additions to all three parts, necessitated, it is stated, by the important progress which is constantly being made in the development of motors. A table of properties of copper wire is included in the Appendix.

ENGINEERING LAW.

By Alexander Haring, M. Am. Soc. C. E. Vol. I.—The Law of Contract. Cloth, $9\frac{1}{2}$ x $6\frac{1}{2}$ in., 10 + 518 pp. Chicago, The Myron C. Clark Publishing Co., 1910. \$4.00.

The purpose of this book, as stated in the preface, is to present a condensed text of the law of contract, to give the general theory of the subject as taught in law schools, and, at the same time, to save the engineer or engineering student the task of reading endless cases. The author hopes that by following the various rules in the order given the student will obtain sufficient information to guide him through the legal phases of this branch of engineering. Cases from practice are given at the end of each chapter, together with brief extracts from engineering decisions. The text is intended for use as a recitation course to be supplemented

by an occasional lecture by the instructor. The Contents are: Tables of Cases Reported; The Contract: Its Inherent Elements; The Contract: Its Formation; The Contract: Parties Affected; The Contract: Its Interpretation; The Contract: Its Discharge; Index.

GARAGES AND MOTOR BOAT HOUSES.

Compiled by William Phillips Comstock. Half-Cloth, $10\frac{1}{2} \times 7\frac{1}{2}$ in., illus., 121 pp. New York, The William T. Comstock Company, 1911. \$2.00.

This publication is made up of a large number of plans for garages and motor-boat houses for both private and commercial purposes and for use in the country, suburban towns, and cities. It is said to include the latest ideas, as to design, construction, and equipment, of well-known architects from various parts of the United States. The Contents are: Introduction; Private Country and Suburban Garages; Private City Garages; Suburban and City Public Garages; Motor Boat Garages; Garage Equipments and Accessories.

PRACTICAL STAMP MILLING AND AMALGAMATION.

By H. W. MacFarren. Cloth, $8 \times 5\frac{1}{2}$ in., 166 pp. San Francisco, Mining and Scientific Press; London, The Mining Magazine, 1910. \$2.00.

This book, it is stated, is an attempt to give in a brief, concise way, practical information in regard to the principles and methods involved in the every-day work of those engaged in stamp-milling and amalgamation. The subject of ore examination and the adjustment of the stamp-mill to ore requirements, is also included. The Contents are: The Stamp-Mill; The Mortar, Die, etc.; Adjustment of Height, Order of Drop, etc.; Water Supply and Power; Principles and Practice of Amalgamation; Retorting; Loss of Gold in Amalgamation and Its Remedies, Mill Tests, etc.; Mill Management; Index.

THE ENGINEERING INDEX ANNUAL FOR 1910.

Compiled from the Engineering Index Published Monthly in *The Engineering Magazine* during 1910. Twenty-seventh year. Cloth, $9\frac{1}{2} \times 6\frac{3}{4}$ in., 30 + 496 pp. New York and London, The Engineering Magazine, 1911. \$2.00.

This Index is intended as a guide to the information contained in the files of engineering periodicals, and, with the volumes published since 1892, is stated to cover thoroughly the field of periodical literature in engineering and closely related applied sciences. The classified plan of indexing, that is, the grouping together of all the current literature on a subject, has again been followed, classifications have been amplified, new divisions introduced, and cross-references freely used. A brief descriptive note is given with each entry, defining its scope and purport. The periodicals indexed number about two hundred and fifty, about three-fourths of which are printed in English, the others being in German, French, Spanish, Italian, and Dutch.

TESTING FOR METALLURGICAL PROCESSES.

By James A. Barr. Cloth, $8 \times 5\frac{1}{2}$ in., illus., 216 pp. San Francisco, Mining and Scientific Press; London, The Mining Magazine, 1910. \$2.00.

The preface states that the subject-matter of this book is based on original notes and experiments made in the laboratories of the Michigan College of Mines. It describes the apparatus and methods used in making laboratory and small-hot tests, and is intended for use by the student and the practicing engineer in the selection of a process of treatment for any ore. The contents are: Amalgamation; Chlorination; Cyanidation; Chloridizing Silver Ores; Pan Amalgamation; Pot Roasting; Parkes Process; Ziervogel Process; Lixiviation; Electrolytic Processes; Zinc Smelting; Furnace Test; Heat Balance; Calorimetry of Fuel; Pyrometry; Retorting; Refining; Concentration Tests; Smelting Ores; Properties of Slags; Smelting Properties of Copper, Lead, Gold, and Silver Ores; Cost Data; Index.

THE CONSERVATION OF WATER.

By John L. Matthews. Cloth, 8 x 5½ in., illus., 8 + 289 pp. Boston, Small, Maynard & Company, 1910. \$2.00.

The conservation of water is so vital a subject, the author states, and the ownership of water is of such importance, that we cannot continue our present slipshod control of it much longer. He has, therefore, taken up the chief elements of the proper care of our water resources, and states that in this book, he will try to simplify and explain them. The Chapter Headings are: Water as a Resource; Floods and Flood Prevention; Storage; Municipal Supply and the Purification of Rivers; Water Power, the Mining of White Coal; Water Power in National Development; Swamp Drainage; Irrigation; Conservation of the Soil; Navigation; The Results of the Conservation of Water; Index.

MORE RECENT CYANIDE PRACTICE.

Edited by H. Foster Bain. Second Edition. Cloth, 9½ x 6 in., illus., 418 pp. San Francisco, Mining and Scientific Press, 1910. \$2.00.

This book is stated to be a compilation of articles contributed originally to the *Mining and Scientific Press* by men who are leaders in the application of cyanide to metallurgy in all parts of the world. The articles cover the development in cyanidation from October, 1907, to July, 1910, and are said to relate to mill construction and operation, to costs, and to the chemistry of the process, and to illustrate the developments both of theory and practice in the period covered.

HAND-BOOK FOR HEATING AND VENTILATING ENGINEERS.

By James D. Hoffman, Assisted by Benjamin F. Raber. Leather, 7 x 4½ in., illus., 322 pp. LaFayette, Indiana, 1910. (Donated by the Author.)

The purpose of this book, as stated in the preface, is to cover the entire field of heating and ventilation, and to serve as a handbook for those engaged in the design and installation of the apparatus connected therewith. The subject-matter has been compiled mostly from lectures delivered before the Senior Mechanical Engineering Class of Purdue University, and while its various phases have not been discussed exhaustively, it is believed by the author to contain all the fundamental principles applied in such a manner as to be easily understood. The Chapter Headings are: Heat; Air; Heat Losses; Furnace Heating; Hot Water and Steam Heating; Mechanical Warm Air Heating; Mechanical Vacuum Heating; District Heating; Temperature Control; Electrical Heating; Course of Instruction; Specifications; Appendix: Tables and Diagrams; Index.

ELECTRIC RAILWAY TRANSPORTATION.

The Annals of the American Academy of Political and Social Science, Vol. XXXVII, No. 1, January, 1911. Emory R. Johnson, Editor. Paper, 10 x 7 in., illus., 244 pp. Philadelphia, American Academy of Political and Social Science, 1911. \$1.00.

This number of *The Annals* contains a series of articles on the traffic and financial problems connected with electric railway transportation and the public regulation of electric railways, by men who are identified with these subjects. The Contents are: Part I, The Urban Transportation Problem, by Blon J. Arnold; The Decreasing Financial Returns upon Urban Street Railway Properties, by Thomas Conway, Jr.; The Depreciation Problem, by William B. Jackson; Methods of Increasing the Efficiency of Surface Lines in Large Cities, by Williston Fish; The Investigation of Traffic Possibilities of Proposed Subway Lines, by William S. Twining; Possibilities of Freight Traffic on Interurban Lines, by Frank S. Cummins; Express Business on Interurban Lines, by A. Eastman; Economic Factors in the Selection of Cars for Urban Service, by Samuel M. Curwen; The Relation of the Electric Railway Company with its Employees, by C. D. Emmons; The Strike Problem on Electric Railways, by Daniel T. Pierce; Educating the Public to a Proper Appreciation of Urban Street Railway Problems, by A. W. Warnock; The Presentation of Interurban Problems to the Public, by A. D. B. Van Zandt. Part II, Valuation of Intangible Street Railway Property, by Frank R. Ford; The Indeterminate Permit as a Satisfactory Franchise, by William Osgood Morgan; State Supervision of Electric Railways in Wisconsin, by B. H. Meyer; The Fruits of Public Regulation in New York, by Milo R. Maltbie; Supervising Engineers and Street Railway Service, by George Weston; Industrial Arbitration in Australia, by Philip S. Eldershaw and Percy Olden.

INDUSTRIAL PLANTS.

Their Arrangement and Construction. By Charles Day. Cloth, $7\frac{1}{2} \times 5\frac{1}{2}$ in., illus., 294 pp. New York, The Engineering Magazine, 1911. \$3.00.

Much of the subject-matter contained in this book has been published in *The Engineering Magazine*, and is stated to define for the first time, in permanent form, the principles and the practical precepts of scientific plant construction. In Chapters I to VIII, inclusive, the broad industrial principles are discussed, together with methods of arrangement and planning of industrial plants. Chapter VII is devoted to a discussion of the use of the route-diagram as a prime factor in laying out work. It is stated that the metal-working trades was selected for considering the subject specifically, and in Chapter IX, the author discusses machine-tool operation and the administration of machine-shop work in order to explain the detailed knowledge required by engineers who plan, construct and arrange industrial properties. Chapter X includes descriptions of modern industrial plants as examples of scientific arrangement, and Chapters XI and XII bear upon the relationship of client and engineer.

KINETIC THEORY OF ENGINEERING STRUCTURES.

Dealing with Stresses, Deformations and Work, for the Use of Students and Practitioners in Civil Engineering. By David A. Molitor, M. Am. Soc. C. E. Cloth, $9\frac{1}{2} \times 7$ in., illus., 15 + 366 pp. New York and London, McGraw-Hill Book Company, 1911. \$5.00.

This work, it is stated, represents an effort to place before the Profession a treatise on the analysis of engineering structures which is based on the most advanced theories and researches of the present time. The reader is supposed to possess a thorough knowledge of the mathematics and mechanics included in the first two years of a Civil Engineering course. While details of the design of bridge members and connections are not discussed, it is stated that the book may be used as a text-book in bridge stresses. Each subject is prefaced by brief historical remarks, and all important theorems bear the names of their originators. The Contents are: Definitions of Terms; Introduction; Reactions and Redundant Conditions; Theorems, Laws, and Formulæ for Framed Structures; Theorems, Laws, and Formulæ for Isotropic Bodies; Influence Lines and Areas for Statically Determinate Structures; Special Applications of Influence Lines to Statically Determinate Structures; Distortion of a Statically Determinate Frame by Graphics; Deflection Polygons of Statically Determinate Structures by Analytics and Graphics; Deflection Influence Lines for Statically Determinate Structures; Influence Lines for Statically Indeterminate Structures; Special Applications of Influence Lines to Statically Indeterminate Structures; Design of Statically Indeterminate Structures; Stresses in Statically Determinate Structures; Secondary Stresses; Mitering Lock Gates; Fixed Masonry Arches; Bibliography; Index.

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Welding: Theory, Practice, Apparatus and Tests, Electric, Thermit and Hot-Flame Processes. By Richard N. Hart. McGraw-Hill Book Company, New York and London, 1910.

Sewage Disposal Works, Their Design and Construction. By W. C. Easdale. E. & F. N. Spon, Limited, London; Spon & Chamberlain, New York, 1910.

Edison, His Life and Inventions. By Frank Lewis Dyer and Thomas Commerford Martin. 2 Vol. Harper & Brothers, New York and London, 1910.

American Society of Municipal Improvements: Proceedings of the Seventeenth Annual Convention held at Erie, Pennsylvania, October 11th, 12th, 13th, and 14th, 1910. S. E. Tate Printing Company, Milwaukee.

The Planning and Construction of High Office-Buildings. By William H. Birkmire. Fourth Edition. John Wiley & Sons, New York; Chapman & Hall, Limited, London, 1906.

Mitteilungen über Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, insbesondere aus den Laboratorien der technischen Hochschulen, herausgegeben vom Verein deutscher Ingenieure. Hefte 98 und 99. Julius Springer, Berlin, 1910.

The Chemistry and Testing of Cement. By Cecil H. Desch. Edward Arnold, London, 1911.

The Complete Cost-Keeper, Some Original Systems of Shop Cost-Keeping or Factory Accounting, Together with an Exposition of the Advantages of Account Keeping by Means of Cards Instead of Books, and a Description of Various Mechanical Aids to Factory Accounting. By Horace Lucian Arnold (Henry Roland). The Engineering Magazine Press, New York and London, 1907.

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Los Angeles, Cal.....		Feb. 28, 1911
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GILLHAM, PHILIP DAKIN. Mgr., Buffalo Dist.	{	Oct. 30, 1906
Sales Office, Corrugated Bar Co., 303		
White Bldg., Buffalo, N. Y.....	Assoc. M.	April 4, 1911
GOODMAN, HARRY MINOTT. 1366 South King	{	June 4, 1907
St., Honolulu, Hawaii.....		
GRAVELL, WILLIAM HENRY. 1218 Chestnut St., Philadel-	Assoc. M.	Feb. 28, 1911
phia, Pa.....		April 4, 1911
HAMMOND, JOHN MILLER. 302 East 43d St., Kansas City,		
Mo.....		April 4, 1911
HENDRICK, EDWARD PIERSON. Civ. Engr. and Supt. of		
Constr., Quartermaster's Dept., U. S. A., 263 Sam-		
mer St., Room 204, Boston, Mass.....		April 4, 1911
HOLDEN, CHARLES ALEXANDER. 237 Rich Ave., Mt. Vernon,		
N. Y.....		Feb. 28, 1911

ASSOCIATE MEMBERS (*Continued*)Date of
Membership.

HOWELL, CLEVES HARRISON. 18 North 5th St., Keokuk, Iowa.....		Feb. 28, 1911
HOWIE, HOWARD BENSON WILBERFORCE. Asst. City Engr., City Engr.'s Office, Chat- tanoooga, Tenn.....	Jun. Assoc. M.	Mar. 6, 1906 Dec. 6, 1910
HULSART, CHARLES RAYMOND. New Paltz, N. Y.....		Jan. 31, 1911
JOHNSON, CHARLES. 8228 Zimple St., New Orleans, La....		Feb. 28, 1911
KIRBY, WILLIAM FRANKLIN. Anawalt, W. Va.....		Jan. 31 1911
KUNKEL, JULIUS STEPHEN. Apartado 94, Tampico, Mexico.		Feb. 28, 1911
LEE, CHARLES HAMILTON. Asst. Engr., Los Angeles Aqueduct, Independence, Cal..	Jun. Assoc. M.	Jan. 2, 1906 Jan. 31, 1911
MONTEBO, JULIO DANIEL. Enramadas alta 34 (altos), Santiago de Cuba, Cuba.....	Jun. Assoc. M.	Oct. 1, 1907 Feb. 28, 1911
POWELL, MAURICE VERNON. Care, Madeira-Mamoré Ry., Caixa 304, Manãos, Brazil.....		Oct. 4, 1910
RALEIGH, WILBUR COLLINS. City Engr., City Hall, Tacoma, Wash.....		Feb. 28, 1911
REED, WILLIAM THOMAS. 201 Devonshire St., Boston, Mass.....		Feb. 28, 1911
REID, JOHN WINFIELD. 900 Railway Exchange Bldg., Chi- cago, Ill.....		Feb. 28, 1911
RIEGEL, ROSS MILTON. Asst. Engr., Designing Div., Board of Water Supply, 165 Broadway, New York City.....	Jun. Assoc. M.	Mar. 5, 1907 Feb. 28, 1911
SAUNDERS, FRANK WILLIAM. Celilo, Ore.....		Feb. 28, 1911
SAWYER, HOWARD LEWDEN. 105 La Salle St., Room 1110, Chicago, Ill.....		Feb. 28, 1911
TOZZER, ARTHUR CLARENCE. Supt. of Constr., Turner Constr. Co., 11 Broadway, New York City.....	Jun. Assoc. M.	April 4, 1905 Feb. 28, 1911
TURNER, JOHN PATRICK. Care, John J. Turner & Sons, 41 East Main St., Amsterdam, N. Y.....		Feb. 28, 1911
WERBIN, ISRAEL VERNON. 2630 Broadway, New York City.		April 4, 1911

ASSOCIATES

CORBALEY, CHARLES WILLIAM. 719 H. W. Hellman Bldg., Los Angeles, Cal.....	Feb. 28, 1911
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JUNIORS

ALEXANDER, LEON BARTON. Room 74, M. C. R. R. Depot, Detroit, Mich.....	Nov. 1, 1910
BAILEY, THOMAS SHERWOOD. 530 Rugby Rd., Schenectady, N. Y.....	Feb. 28, 1911
BLIGHT, ARTHUR FREDERICK. 2701 West 35th St., Denver, Colo.....	Feb. 28, 1911

JUNIORS (<i>Continued</i>)		Date of Membership.
BROWN, CLARENCE COWGILL. Care, Baxter L. Brown, 610 Merchants-Laclede Bldg., St. Louis, Mo.....		Feb. 28, 1911
HUTH, CHRISTIAN. 1106 The Rookery, Chicago, Ill.....		Jan. 3, 1911
MENKE, WILLIAM. 517 West 171st St., New York City....		Dec. 6, 1910
MORRISON, ROGER LEROY. 511 East Green St., Champaign, Ill.....		April 4, 1911
NITCHIE, FRANCIS RAYMOND. Bureau of Standards, Washington, D. C.....		Jan. 3, 1911
PROCTOR, ASA GLISSON. Woodland, Yolo Co., Cal.....		Oct. 4, 1910
SMALLMAN, RALPH ALCORN. 1205 McKinney Ave., Houston, Tex.....		Jan. 31, 1911
SMITH, WILLIAM DURKEE. 7357 Fourteenth Ave., N. W., Seattle, Wash.....		Oct. 4, 1910
WOODS, HARLAND CLARK. Univ. of Colorado, Boulder, Colo.		Feb. 28, 1911

CHANGES OF ADDRESS

MEMBERS

ANDREWS, DANIEL MARSHALL. U. S. Asst. Engr., P. O. Box 72, Rome, Ga.	
ASHBAUGH, LEWIS EUGENE. Hydr. Engr., J. G. White & Co., 9 Cloak Lane, Cannon St., London, E. C., England.	
BAKER, HOLLAND WILLIAMS. Care, Dubuque Boat & Boiler Works, Dubuque, Iowa.	
BALLINGER, WALTER FRANCIS. (Ballinger & Perrot, Archts. and Engrs.), 1211 Arch St., Philadelphia, Pa.	
BARRALLY, THOMAS WEBSTER. (Barrally & Ingersoll, Engrs. and Contrs.), 853 Powers Bldg., Rochester, N. Y.	
BATES, ONWARD. 332 South Michigan Ave., Chicago, Ill.	
BIENENFELD, ABEL MORRIS. Cons. Engr., Wells-Fargo Bldg., San Francisco, Cal.	
BISSELL, FRANK EDWARD. Chf. Engr., Akron, Canton & Youngstown Ry., 317 Everett Bldg., Akron, Ohio.	
BLANCHARD, MURRAY. Care, Northern Contr. Co., Tallulah Falls, Ga.	
BOWERS, GEORGE. 359 Westford St., Lowell, Mass.	
CODE, WILLIAM HENRY. Chf. Engr., U. S. Indian Service, 526 Federal Bldg., Los Angeles, Cal.	
COLLINS, RODERICK GREENE, JR. 1 Madison Ave., New York City.	
COOPER, HUGH LINCOLN. Keokuk, Iowa.	
COWLES, WALTER LINSLEY. Div. Engr., Div. of Design, Chicago Passenger Subways, 105 S. La Salle St., Chicago, Ill.	
CURTIS, WALTER WHALEY. Cons. Engr., 537 South Dearborn St., Chicago, Ill.	
DAVIS, CHARLES STRATTON. 4700 Racine Ave., Chicago, Ill.	
DENCER, FREDERICK WILLIAM. Engr., Gary Plant, Am. Bridge Co., Gary, Ind.	

MEMBERS (*Continued*)

- DUNN, DANIEL BURKE. Chf. Engr., Macon, Dublin & Savannah R. R., Macon, Ga.
- FERGUSON, HARDY SMITH. 200 Fifth Ave., New York City.
- FIELD, FREDERICK ELBERT. Care, Hering & Fuller, 170 Broadway, Room 1011, New York City.
- FITCH, CHARLES HALL. Engr. in Chg., Salt River Project, U. S. Reclamation Service, Phoenix, Ariz.
- FITCH, GRAHAM DENBY. Lt.-Col., Corps of Engrs., U. S. A., U. S. Engr. Office, Montgomery, Ala.
- FORD, FREDERICK LUTHER. (Ford, Buck & Sheldon, Inc.), 60 Prospect St., Hartford, Conn.
- GARDINER, JOHN PEDEN. Civ. and Hydr. Engr., 226 Laughlin Bldg., Los Angeles, Cal.
- GREENE, FRANCIS VINTON. 65 Pine St., New York City.
- HAGUE, CHARLES ARTHUR. Cons. Engr., 147 West 94th St., New York City.
- HARRIS, STEPHEN. 7219 Boyer St., Mt. Airy, Philadelphia, Pa.
- HOUSTON, GAVIN NELSON. Cons. and Superv. Engr., 409 Equitable Bldg., Denver, Colo.
- HUBBELL, CLARENCE WILLIAM. Chf. Engr., Bureau Public Works, Philippine Islands, Manila, Philippine Islands.
- JACKSON, THOMAS HERBERT. Capt., Corps of Engrs., U. S. A., U. S. Engr. Office, Dallas, Tex.
- JOHNSON, LUCIEN SAMUEL. U. S. Engr. Office, Louisa, Ky.
- KIBBE, AUGUSTUS SAYRE. 925 Chicago Stock Exchange Bldg., Chicago, Ill.
- LAYFIELD, ELWOOD NORMAN. Chairman, Grand Rapids Grade Separation Comm., 535 Houseman Bldg., Grand Rapids, Mich.
- LEE, FRANCIS VALENTINE TOLDEY. Asst. Gen. Mgr. and Chairman, Eng. Committee, Pacific Gas & Elec. Co. and San Francisco Gas & Elec. Co., San Francisco, Cal.; Care, The Royal Colonial Inst., Northumberland Ave., London, W. C., England.
- MALTBY, FRANK BIERCE. Chf. Engr. and Gen. Mgr. (Gahren, Dodge & Maltby), 29 Broadway, New York City.
- MARTIN, WISNER. 141 Milk St., Boston, Mass.
- MOORE, JAMES EDWIN ALEXANDER. Chf. Engr., C. O. Bartlett & Snow Co., Cleveland, Ohio.
- MOORE, JOHN WILLIAM. Chf. Engr., Indianapolis & Cincinnati Traction Co., 3321 North Capitol Ave., Indianapolis, Ind.
- NICHOLS, CHARLES HART. Cons. Engr., 1133 Broadway, New York City.
- POLLEYS, WILLIAM VAUGHN. Supt. of Constr., Stone & Webster Eng. Corporation, Box 345, Norristown, Pa.
- RIBLET, BYRON CHRISTIAN. 614 Realty Bldg., Spokane, Wash.
- RITCHIE, JAMES. Cons. Engr., 1907 East 35th St., Cleveland, Ohio.
- ROCKWELL, JAMES VINCENT. Civ. Engr., U. S. N., U. S. Navy Yard, Charleston, S. C.
- RUNDLETT, LEONARD W. 607 Lincoln Ave., St. Paul, Minn.

MEMBERS (*Continued*)

- RUPLE, COMMODORE PERRY. Vice-Pres., The C. H. Fath & Son Const. Co., 1907 E. 35th St., Cleveland, Ohio.
- SHAW, SUMNER FARNHAM. Chf. Engr., Location, Brazil Ry., São Paulo, Brazil.
- SHOEMAKER, MARSHALL NEY. Vice-Pres., Am. Concrete Steel Co., 151 Clifton Ave., Newark, N. J.
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- TOWER, MORTON LOUDON. U. S. Asst. Engr., 210 Federal Bldg., Eureka, Cal.
- VENABLE, WILLIAM MAYO. Cons. Engr. (Burke & Venable), Room 706, Second National Bank Bldg., Cincinnati, Ohio.
- WHITE, HENRY FISHER. Montrose, Colo.

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- ANDERSON, CHARLES LOUIS BATES. Chf. Engr., Clarendon Constr. Co., P. O. Box 513, Wilmington, N. C.
- BERRY, CLAUDE. Care, Modern Steel Structural Co., Waukesha, Wis.
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- BRINKLEY, MILO HAMILTON. Room 2238, Grand Central Terminal, New York City.
- BROOKS, MILES ELIJAH. Locating Engr., Kettle River Val. Ry., Summerland, B. C., Canada.
- BRUNING, HENRY DIEDRICH. 150 E. 13th Ave., Columbus, Ohio.
- BUNKER, STEPHEN SANS. Div. Engr., Madeira-Mamoré Ry., P. O. Box 304, Manaus, Brazil.
- BURT, LUTHER HAROLD. Cons. Engr. (L. W. Burt & Son), 39 Pearl St., Hartford, Conn.
- CLAPP, WILFRED ATHERTON. Care, Const. Quartermaster, Fort McDowell, Cal.
- COOMER, ROSS MILLER. 449 Washington Ave., Belleville, N. J.
- COOPER, DAVID REGINALD. Care, Ontario Power Co., P. O. Box 3, Niagara Falls, N. Y.
- CUNNINGHAM, JOHN GEORGE LAWRENCE. Abasolo y 7a, Matamoros, Mexico.
- DAVIS, FRED RUFUS. 1957 East 14th St., Brooklyn, N. Y.

ASSOCIATE MEMBERS (*Continued*)

- DE GRATESSE, JOSEPH REYGONDEAU. Hawkesbury, Ont., Canada.
- DERRICK, CLARENCE. 130 Black Rock Ave., New Britain, Conn.
- DONAHEY, JOSEPH ALEXANDER. Asst. Engr., The Akron, Canton & Youngstown Ry. Co., 317 Everett Bldg., Akron, Ohio.
- DUNN, HERBERT LUTHER. 62 Livingston St., Brooklyn, N. Y.
- FISCHER, THEODORE CHRISTIAN. 535 Adams Ave., Elizabeth, N. J.
- FISK, ANDREW JACKSON, JR. Civ. and Hydr. Engr., Helena, Mont.
- GAYLER, ERNEST ROTTECK. Civ. Engr., U. S. N., Naval Station, Honolulu, Hawaii.
- GOODMAN, LEON. 1825 Commercial National Bank Bldg., Chicago, Ill.
- GRAY, EDWARD, JR. Asst. Engr., C. & O. Ry. Co., 114 North 4th St., Richmond, Va.
- HALDEMAN, WALTER STANLEY. Chf. Engr., H. L. Stevens & Co., 510 Hall Bldg., Kansas City, Mo.
- HANCOCK, HENRY SYDNEY, JR. Cons. Engr., 315 Pacific Bldg., Vancouver, B. C., Canada.
- HARDESTY, JAMES ROBERT. Contr. Engr., Virginia Bridge & Iron Co., Roanoke, Va.
- HAUCK, WILLIAM. Room 2003, Park Row Bldg., New York City.
- HAYS, DON. Dist. Engr., C., M. & P. S. Ry., 416 N. Second St., North Yakima, Wash.
- HAYS, DONALD SYMINGTON. Care, Mt. Hood Ry. & Power Co., Portland, Ore.
- HERMANN, FRANK EDWARD. Care, C. W. Hudson, 45 Broadway, New York City.
- HOWE, HERBERT FRANK. Care, Spanish-American Iron Co., Felton, Oriente, Cuba.
- HUDSON, HAROLD WALTON. Engr., Rockfish Val. R. R., Nellysford, Nelson Co., Va.
- JOHANNESSON, SIGVALD. 149 Chestnut St., Montclair, N. J.
- JOHNSON, EDWIN SAMUEL. Gen. Mgr. and Chf. Engr., South Penn Rys. & Light Co., Meyersdale, Pa.
- LATHROP, JAY COWDEN. Chf. Engr., Iowa Traction Co., Oskaloosa, Iowa.
- LIGHTFOOT, WILLIAM JOSEPH. U. S. Surv. and Special Disbursing Agt., Dept. of the Interior; Care, U. S. Surveyor-General, San Francisco, Cal.
- MEEM, JAMES LAWRENCE. Civ. Engr. and Contr., 1310 Church St., Lynchburg, Va.
- MELICK, NEAL ALBERT. Supt. of Constr., U. S. Public Bldgs., Granite City, Ill.
- MILLER, GEORGE SOTER. 16 Bank of Toronto Chambers, Montreal, Que., Canada.
- NOYES, HARRY LINCOLN. Care, Union Carbide Co., Niagara Falls, N. Y.
- OAKES, LUTHER STEVENS. 801 Globe Bldg., Minneapolis, Minn.
- PAGET, CHARLES SOUDERS. (Purnell & Paget, Archts. and Engrs.), Shameen, Canton, China.

ASSOCIATE MEMBERS (*Continued*)

- PATCH, HOMER AUSTIN. Contr. Engr., Minneapolis Steel & Machinery Co., 1317 E. Rio Grande St., El Paso, Tex.
- PERROT, EMILE GEORGE. (Ballinger & Perrot, Archts. and Engrs.), 1211 Arch St., Philadelphia, Pa.
- PHILLIPS, THEODORE CLIFFORD. Civ. and Hydr. Engr., 4942 Washington Ave., Chicago, Ill.
- POOLE, CHARLES ARTHUR. Care, City Engr.'s Office, Rochester, N. Y.
- RANKIN, HARRY HOWARD. Civ. and Min. Engr., 1321 Park Bldg. (Res., 5547 Raleigh St., near Wightman St.), Pittsburg, Pa.
- RIGGS, THOMAS, JR. Engr., to the Comm., Alaska Boundary Survey; Address, Coast and Geodetic Survey, Washington, D. C.
- ROBBINS, HALLET RICE. Civ. and Min. Engr., P. O. Box 51, Seattle, Wash.
- SARGENT, JOSEPH ANDREWS. Eng. Adviser, Northwest Co., Inc., 605 Lumberman's Bldg., Portland, Ore.
- SAWYER, DONALD HUBBARD. Treas., Northwestern Eng. Corporation, General Delivery, Portland, Ore.
- SCHUBERT, CHARLES WESLEY. Structural Engr., Estimating Dept., The Brown Hoisting Machinery Co. (Res., 1357 East 110th St.), Cleveland, Ohio.
- SESSER, JOHN CORNELIOUS. Asst. Engr., M. of W., G. N. R. R. System, St. Paul, Minn.
- SHORTT, JOHN HAGGERTY. 407 Huron St., Toronto, Ont., Canada.
- SISSON, GEORGE ARTHUR. Supt., Div. 3, Dalles-Celilo Canal, U. S. Engr. Office, Big Eddy, *via* The Dalles, Ore.
- SMITH, COURTLAND ELMORE. 174 Prospect Pl., Brooklyn, N. Y.
- TAYLOR, EDWARD BALLINGER, JR. Div. Engr., Logansport Div., P., C., C. & St. L. Ry., Logansport, Ind.
- TOLTZ, MAX. Gen. Mgr., Manistee & Grand Rapids R. R., 1614 P. P. Bldg., St. Paul, Minn.
- TOMBO, CARL. 321 St. Nicholas Ave., New York City.
- TOOKER, FRANCIS WESTERVELT. 1 Madison Ave., New York City.
- TREADWAY, HOWARD PLATT. Vice-Pres. and Treas., Kansas City Bridge Co., 510 Orear-Leslie Bldg., Kansas City, Mo.
- TUDBURY, WARREN CHAMBERLAIN. 47 West 126th St., New York City.
- TYLER, ROY DEXTER. 2607 Warren, Cheyenne, Wyo.
- VOGT, JOHN HENRY LEON. 1009 Penn. Ave., San Diego, Cal.
- WAITE, DONALD CRAMER. Asst. Engr., Interborough Rapid Transit Co., 165 Broadway, New York City (Res., 1397 East 17th St., Brooklyn, N. Y.).
- WHITE, LAZARUS. Div. Engr., Board of Water Supply, City of New York, 612 West 137th St., New York City.
- WILLARD, NORMAN RAND. Care, Ambursen Hydr. Constr. Co., 88 Pearl St., Boston, Mass.
- WILLS, ARTHUR JOHN. 2561 Mance St., Montreal, Que., Canada.
- WINN, WALTER SCOTT. Secy. and Mgr., The North Alabama Constr. Co., Demopolis, Ala.

ASSOCIATE MEMBERS (*Continued*)

- WITHAM, MYRON ELLIS. Cons. Engr. (Bull & Witham), 1015 Foster Bldg., Denver, Colo.
WOLFF, HANS HERMANN. Care, Cross & Wolff Eng. & Contr. Co., 738 Henry Bldg., Seattle, Wash.

ASSOCIATES

- STROEBE, GEORGE GOTTLIEB. Baguir, Mountain Prov., Philippine Islands.

JUNIORS

- BAKER, NED DUNCAN. 4001 West St., Oakland, Cal.
BARKER, JAMES MADISON. 20 Oxford St., Pittsfield, Mass.
BRAINARD, ALBERT SERENO. (Alderson & Brainard, Engrs. and Survs.), 49 Pearl St., Hartford, Conn.
BROWN, DAVID HARELL. Engr., M. of W., Salt Lake & Ogden Ry., Box 240, Ogden, Utah.
BROWN, GROVER CHARLES. Junior Engr., Am. Section, International Waterways Comm., 328 Federal Bldg., Buffalo, N. Y.
BURNHAM, GEORGE EARLE. Bureau of Lands, Manila, Philippine Islands.
BURPEE, GEORGE WILLIAM. Care, Westinghouse, Church, Kerr & Co., 10 Bridge St., New York City.
BURTON, WAYNE JOSEPH. Div. Engr., Mo. Pac. Ry., Pueblo, Colo.
BUSHELL, ARTHUR WILLIAM. Bureau of Lands, Manila, Philippine Islands.
ELLSWORTH, LINCOLN. Engr., Yale Expedition to Peru, 18 East 53d St., New York City.
ENTENMANN, PAUL MAX. Asst. Engr., Public Service Comm., First Dist., 317 Sixth Ave., Brooklyn, N. Y.
FOSS, JAMES CALVIN, JR. Chf. Engr., Kahului R. R., Kahului, Maui, Hawaii.
HARPER, FREDERICK CLAYTON. Mgr., Chicago Unit Constr. Co., 91 Dearborn St., Chicago, Ill.
HEMPHILL, WILLIAM LIND. Surv., Bureau of Lands, Manila, Philippine Islands.
HESS, JOHN STRIDER. 903 Pine St., San Francisco, Cal.
HOEFT, GEORGE ELIOT. 182 Lincoln St., Brooklyn, N. Y.
HORTON, JOHN WILLIAM. Asst. Engr., Central California Traction Co., 2614 California Ave., Sacramento, Cal.
KINGSLEY, GEORGE. 985 Fox St., New York City.
KIRKWOOD, HOWARD CAMBERNE. Asst. Engr., Penn. T. & T. R. R. Co., Pennsylvania Station, New York City (Res., 212 Barclay St., Flushing, N. Y.).
KNUTSON, GEORGE HENRY. Care, Wm. G. Fargo, Cons. Engr., 303 Commonwealth Bldg., Jackson, Mich.
LEWIS, WILFRED. 207 Harvard Ave., N., Seattle, Wash.
NOYES, STEPHEN HENLEY. 15 Francis St., Newport, R. I.
RENNELL, HENRY HURD. Asst. Engr., United Rys. of Havana, Egido 2, Havana, Cuba.
ROBERG, RALPH MASON. Supt. of Constr., H. L. Stevens & Co., P. O. Box 276, Roswell, N. Mex.

JUNIORS (*Continued*)

- ROBERTS, HAROLD WHITNEY. With Rapid Transit Subway Constr. Co., 165 Broadway (Res., 619 West 136th St.), New York City.
- RUSSELL, ALEXANDER STUART. 418 Fleming Bldg., Phoenix, Ariz.
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- TEFFT, WILLIAM WOLCOTT. Constr. Office, Wealthy Ave. Steam Plant, Grand Rapids, Mich.
- TILLIT, PEDRO ERNESTO. General Delivery, Chicago, Ill.
- TRASK, WARREN DUDLEY. 37 Sewall St., Augusta, Me.
- TYLER, RICHARD GAINES. Instr. in Civ. Eng., Univ. of Texas, 1506 Congress Ave., Austin, Tex.
- VAN VLECK, JAMES BRACKETT. 5831 Clemens Ave., St. Louis, Mo.
- VOLCK, ADALBERT GEORGE. R. F. D. No. 2, Bingham Mills, Germantown, N. Y.
- WARRACK, JAMES BALDWIN. Supt. of Constr., Oregon-Washington R. R. & Nav. Co., Seattle, Wash.
- WEAVER, EARLL CHASE. Care, Clayton Orchards, Ashland, Ore.
- WILBANKS, JOHN ROBERT. Care, Franklin Bank, St. Louis, Mo.
- WRIGHT, ALBERT EUGENE. 482 South 7th East, Provo, Utah.

RESIGNATIONS

JUNIORS

	Date of Resignation.
COOK, JOHN WHEELER.....	April 4, 1911

DEATHS

- CALDWELL, GEORGE BOWERS. Elected Member, April 1st, 1908; died March 31st, 1911.
- HAWKINS, IRVING. Elected Associate Member, May 6th, 1908; died March 14th, 1911.
- LOMBARDO, JAVIER DIAZ. Elected Associate Member, October 2d, 1907; died March 22d, 1911.
- LYDSTON, WALTER EDWARD. Elected Junior, April 4th, 1905; died May 8th, 1910.
- SHIMA, TAKEJIRO. Elected Associate Member, March 4th, 1903; died December, 1910.

Total Membership of the Society, April 11, 1911,

5 940.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(March 7th to April 7th, 1911)

NOTE.—This list is published for the purpose of placing before the members of the Society the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- | | |
|--|---|
| (1) <i>Journal</i> , Assoc. Eng. Soc., 31 Milk St., Boston, Mass., 30c. | (28) <i>Journal</i> , New England Water-Works Assoc., Boston, Mass., \$1. |
| (2) <i>Proceedings</i> , Engrs. Club of Phila., 1317 Spruce St., Philadelphia, Pa. | (29) <i>Journal</i> , Royal Society of Arts, London, England, 15c. |
| (3) <i>Journal</i> , Franklin Inst., Philadelphia, Pa., 50c. | (30) <i>Annales des Travaux Publics de Belgique</i> , Brussels, Belgium. |
| (4) <i>Journal</i> , Western Soc. of Engrs., Monadnock Bldg., Chicago, Ill. | (31) <i>Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand</i> , Brussels, Belgium. |
| (5) <i>Transactions</i> , Can. Soc. C. E., Montreal, Que., Canada. | (32) <i>Mémoires et Compte Rendu des Travaux</i> , Soc. Ing. Civ. de France, Paris, France. |
| (6) <i>School of Mines Quarterly</i> , Columbia Univ., New York City, 50c. | (33) <i>Le Génie Civil</i> , Paris, France. |
| (8) <i>Stevens Institute Indicator</i> , Stevens Inst., Hoboken, N. J., 50c. | (34) <i>Portfeuille Economiques des Machines</i> , Paris, France. |
| (9) <i>Engineering Magazine</i> , New York City, 25c. | (35) <i>Nouvelles Annales de la Construction</i> , Paris, France. |
| (10) <i>Cassier's Magazine</i> , New York City, 25c. | (37) <i>Revue de Mécanique</i> , Paris, France. |
| (11) <i>Engineering</i> (London), W. H. Wiley, New York City, 25c. | (38) <i>Revue Générale des Chemins de Fer et des Tramways</i> , Paris, France. |
| (12) <i>The Engineer</i> (London), International News Co., New York City, 35c. | (42) <i>Proceedings</i> , Am. Inst. Elec. Engrs., New York City, 50c. |
| (13) <i>Engineering News</i> , New York City, 15c. | (43) <i>Annales des Ponts et Chaussées</i> , Paris, France. |
| (14) <i>Engineering Record</i> , New York City, 12c. | (44) <i>Journal</i> , Military Service Institution, Governors Island, New York Harbor, 50c. |
| (15) <i>Railway Age Gazette</i> , New York City, 15c. | (45) <i>Mines and Minerals</i> , Scranton, Pa., 20c. |
| (16) <i>Engineering and Mining Journal</i> , New York City, 15c. | (46) <i>Scientific American</i> , New York City, 8c. |
| (17) <i>Electric Railway Journal</i> , New York City, 10c. | (47) <i>Mechanical Engineer</i> , Manchester, England. |
| (18) <i>Railway and Engineering Review</i> , Chicago, Ill., 10c. | (48) <i>Zeitschrift</i> , Verein Deutscher Ingenieure, Berlin, Germany. |
| (19) <i>Scientific American Supplement</i> , New York City, 10c. | (49) <i>Zeitschrift für Bauwesen</i> , Berlin, Germany. |
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| (21) <i>Railway Engineer</i> , London, England, 25c. | (51) <i>Deutsche Bauzeitung</i> , Berlin, Germany. |
| (22) <i>Iron and Coal Trades Review</i> , London, England, 25c. | (52) <i>Rigasche Industrie-Zeitung</i> , Riga, Russia. |
| (23) <i>Bulletin</i> , American Iron and Steel Assoc., Philadelphia, Pa. | (53) <i>Zeitschrift</i> , Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria. |
| (24) <i>American Gas Light Journal</i> , New York City, 10c. | (54) <i>Transactions</i> , Am. Soc. C. E., New York City, \$4. |
| (25) <i>American Engineer</i> , New York City, 20c. | (55) <i>Transactions</i> , Am. Soc. M. E., New York City, \$10. |
| (26) <i>Electrical Review</i> , London, England. | (56) <i>Transactions</i> , Am. Inst. Min. Engrs., New York City, \$5. |
| (27) <i>Electrical World</i> , New York City, 10c. | (57) <i>Colliery Guardian</i> , London, England. |

- (58) *Proceedings*, Engrs.' Soc. W. Pa., 803 Fulton Bldg., Pittsburg, Pa., 50c.
- (59) *Transactions*, Mining Inst. of Scotland, London and Newcastle-upon-Tyne, England.
- (60) *Municipal Engineering*, Indianapolis, Ind., 25c.
- (61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
- (62) *Industrial World*, 59 Ninth St., Pittsburg, Pa.
- (63) *Minutes of Proceedings*, Inst. C. E., London, England.
- (64) *Power*, New York City, 20c.
- (65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
- (66) *Journal of Gas Lighting*, London, England, 15c.
- (67) *Cement and Engineering News*, Chicago, Ill., 25c.
- (68) *Mining Journal*, London, England.
- (70) *Engineering Review*, New York City, 10c.
- (71) *Journal*, Iron and Steel Inst., London, England.
- (71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.
- (73) *Electrician*, London, England, 18c.
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- (75) *Proceedings*, Inst. of Mech. Engrs., London, England.
- (76) *Brick*, Chicago, Ill., 10c.
- (77) *Journal*, Inst. Elec. Engrs., London, England.
- (78) *Beton und Eisen*, Vienna, Austria.
- (79) *Forscherarbeiten*, Vienna, Austria.
- (80) *Tonindustrie Zeitung*, Berlin, Germany.
- (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
- (83) *Progressive Age*, New York City, 15c.
- (84) *Le Ciment*, Paris, France.
- (85) *Proceedings*, Am. Ry. Eng. and M. of W. Assoc., Chicago, Ill.
- (86) *Engineering-Contracting*, Chicago, Ill., 10c.
- (87) *Roadmaster and Foreman*, Chicago, Ill., 10c.
- (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.
- (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa.
- (90) *Transactions*, Inst. of Naval Archts., London, England.
- (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
- (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
- (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
- (94) *The Boiler Maker*, New York City, 10c.
- (95) *International Marine Engineering*, New York City, 20c.
- (96) *Canadian Engineer*, Toronto, Canada, 15c.
- (97) *Turbine*, Berlin, Germany, 1 Mark.
- (98) *Journal*, Engrs. Soc. Pa., 219 Market St., Harrisburg, Pa., 30c.
- (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$1.50.
- (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., \$1.
- (101) *Metal Worker*, New York City, 10c.
- (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
- (103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
- (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
- (105) *Metallurgical and Chemical Engineering*, New York City, 25c.

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 Some Phenomena and Applications of the Electric Current.* J. G. Clark. (Paper read before the London and Southern Dist. Jun. Gas Assoc.) (66) Feb. 28.
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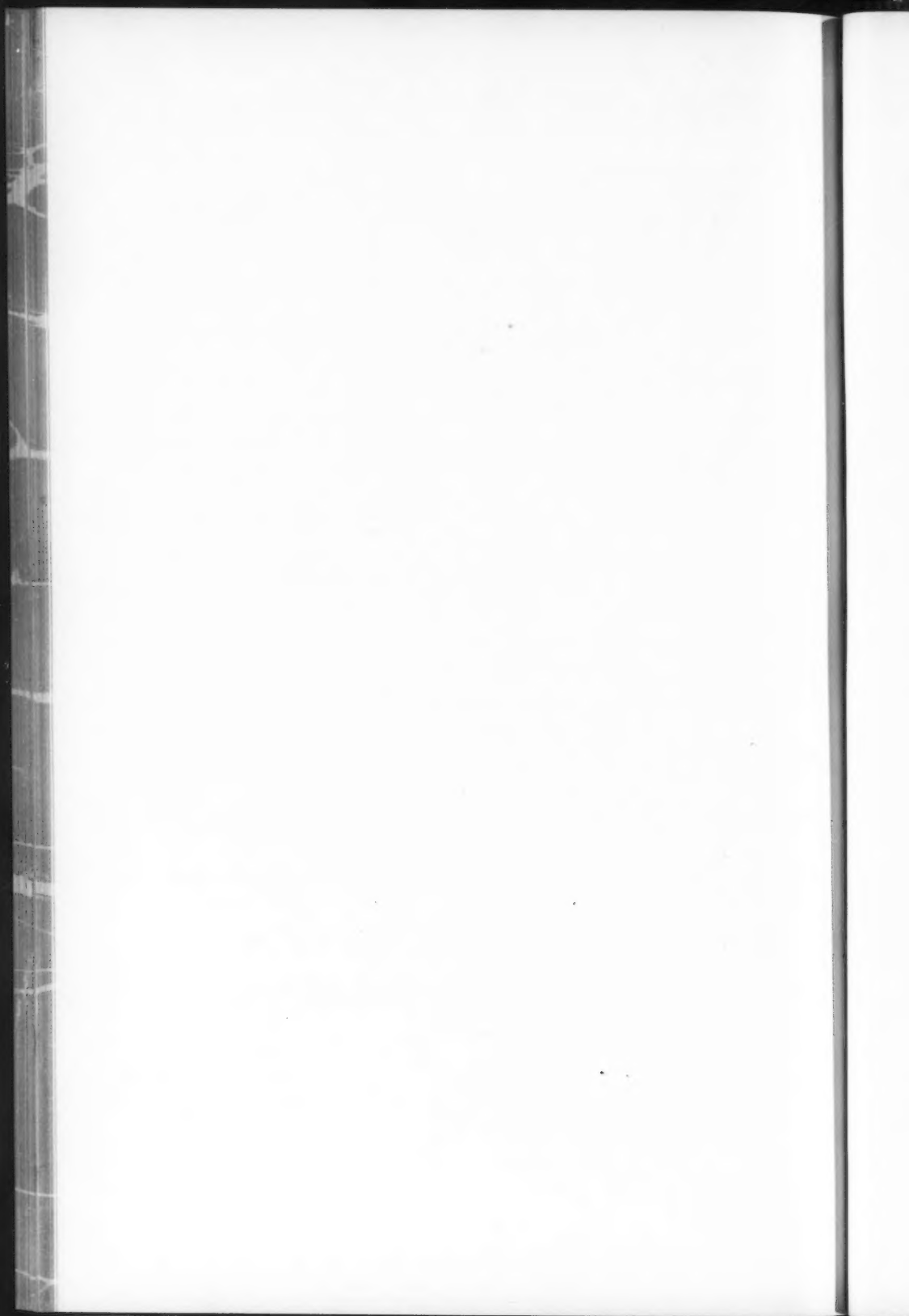
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 Shaft of Detroit Salt Company.* Albert H. Fay. (16) Mar. 18.
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 The Marianna Coal Mines.* Hartley M. Phelps. (45) Apr.
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 Core Drills in the Joplin District.* Frank W. Sansom. (16) Apr. 1.
 A Rotatable Zinc Smelting Furnace.* G. A. Wettengel. (16) Apr. 1.
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- The Costa Rica Volcanos and the Earthquakes of April 13 and May 4, 1910. T. A. Jaggar. (1) Feb.
 Entropy.* G. A. Goodenough. (4) Mar.
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- Road Work in Pennsylvania and Some of Its Problems. Joseph W. Hunter. (98) Feb.
 Cement Concrete Street Paving in Mason City, Iowa. F. P. Wilson. (Paper read before the Iowa Engrs.' Soc.) (60) Mar.; (13) Mar. 9.
 Simplification of Traffic Records for Purposes of Comparison. W. W. Crosby. (60) Mar.; (104) Mar. 10.
 The Economical Maintenance of Dirt Roads. Walter B. Thomson. (98) Mar.

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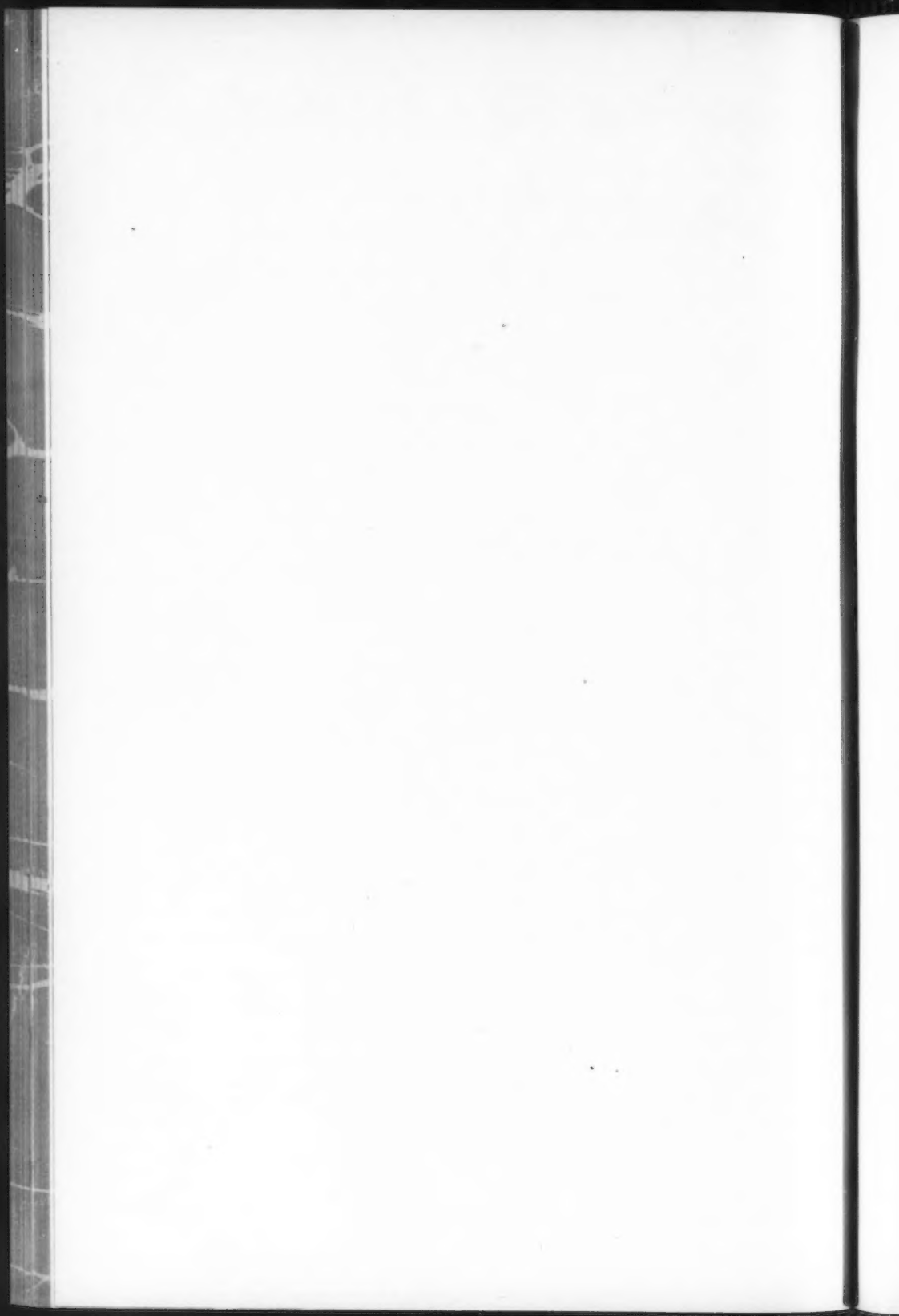
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- The Good Roads Train. John Price Jackson. (98) Mar.
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 Dustless Roads of California. Austin B. Fletcher, M. Am. Soc. C. E. (Paper read before the A. A. A. Convention.) (96) Mar. 2.
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 Concrete Pavements in Chattanooga. Howard Eggleston. (14) Mar. 11.
 Treatment of Hard Pavement to Prevent Slipperiness.* (14) Mar. 11.
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 Cracking of Cement-Grouted Brick Pavements: Causes and Remedies. Earle R. Whitmore. (Paper read before the Mich. Eng. Soc.) (13) Apr. 6; (96) Mar. 23.
 Emploi du Goudron dans le Corps de la Chaussée Essais Faits à Aix-les-Bains de 1906 à 1910. Luya. (43) Jan.
 Studie über Feldwege. M. Graevell. (81) Pt. 2.

Railroads.

- Remedies for Landslides and Slips on the Kanawha and Michigan Railway.* R. P. Black, Assoc. M. Am. Soc. C. E. (54) Vol. 71.
 The Reconstruction of the Passenger Terminals at Washington, D. C.* W. F. Strouse, M. Am. Soc. C. E. (54) Vol. 71.
 The Wireless as an Adjunct in the Operation of a Railroad. Frederick H. Millener. (65) Feb. 17.
 Gas Lighting for Railway Carriages. (66) Feb. 28.
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 Automatic Alarm Bell for Railway Level Crossings.* (21) Mar.
 Articulated and Duplex Locomotives.* (21) Mar.
 The Prevention of the Over-Running of Signals. A. Blum. (From *Zeit. d. Ver. deutsch. Eisenbahnverwaltung*.) (88) Mar.
 The Permanent Way of the Shanghai-Nanking Railway.* (21) Mar.
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 Alloy Steels for Railroad Use. Henry Southers. (25) Mar.
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 The Permanent Way of the Java Railways.* (21) Serial beginning Mar.
 A New Mountain Railway in Baden. Kuntzemüller. (From *Zeit. d. Ver. deutsch. Eisenbahnverwaltung*.) (88) Mar.
 Converted Mallet Locomotive; Atchison, Topeka and Santa Fe Railroad.* (11) Mar. 3.
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- Signalling. Francis C. Boyd. (Paper read before the Soc. of Engrs.) (96) Mar. 9; (47) Feb. 24; (18) Mar. 11.
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- A Remarkable Locomotive.* (12) Mar. 10.
- Signal Aspects. L. R. Clausen. (Paper read before the Canadian Ry. Club.) (15) Mar. 10.
- Performance of Pacific Type Locomotive; Pennsylvania Lines.* (15) Mar. 10.
- Effect of Undulating Grades on Train Velocity.* F. S. Foote, Jr. (15) Mar. 10.
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- Shop Improvements of the Chesapeake & Ohio Ry. at Huntington, W. Va.* (18) Mar. 11.
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- Clearance Car, Pennsylvania R. R.* (18) Mar. 25.
- Wheel Turning.* H. S. Williams. (17) (Abstract of paper read before the Central Elec. Ry. Assoc.) (17) Mar. 25.
- The Use of Sand on Interurban Cars. Walter H. Evans. (Abstract of paper read before the Central Elec. Ry. Assoc.) (17) Mar. 25.
- Economical Limits for Flange Wear on Steel-Tired and Rolled-Steel Wheels.* John Sibbald. (17) Mar. 25.
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- Heavy Combined Pacific Type Locomotives; New York Central Lines.* (15) Mar. 31; (25) Apr.
- Electrification Analyzed, and Its Practical Application to Trunk Line Roads, Inclusive of Freight and Passenger Operation.* William S. Murray. (42) Apr.
- Some Recent Developments in Railway Telephony.* Gregory Brown. (42) Apr.
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- Heating Test of Driving Tires.* (25) Apr.
- Road Test of 2-6-6-2 Type Locomotive, Chicago, Milwaukee & St. Paul Railway.* (25) Apr.
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- Methods and Some Costs of the Construction of the St. Paul Pass Tunnel.* K. C. Weedon, M. Am. Soc. C. E. (86) Apr. 5.
- Portable Storage Batteries as Applied to Automatic Signals on the Harriman Lines. A. H. McKeen. (Abstract of paper read before the Ry. Signal Assoc.) (13) Apr. 6.

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 La Traction Electrique en Allemagne et en Suisse.* Ch. Dantin. (33) Feb. 25.
 Locomotives Compound Articulées Système Mallet.* (34) Mar.
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 Le Statut des Agents de Chemin de Fer et le Règlement Pacifique des Différends Collectifs. (From *Revue Politique et Parlementaire*.) (38) Mar.
 Die Betriebsmittel der Hedjazbahn.* P. Levy. (102) Serial beginning Mar. 1.
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- A Shuttle System for Chicago Subways.* A. S. Robinson. (4) Mar.
 Elevated Railway of Boston.* (21) Mar.
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 The Use of T-Rail in Streets. Fred G. Simmons. (Abstract of paper read before the Eng. Soc. of Wis.) (17) Mar. 18.
 Track Construction in Oklahoma City.* W. A. Haller. (17) Mar. 18.
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 Tournée de l'Association des Ingénieurs des Ponts et Chaussées et des Mines sur les Chantiers de la Ligne Métropolitaine No. 8.* Suquet, Vasseur et Thomas. (43) Jan.
 Le Métropolitain de Paris Ligne No. 8, d'Auteuil à l'Opéra par Grenelle.* L. Blette. (33) Mar. 11.
 Die Enquete, betreffend die Elektrisierung der Wiener Stadtbahn. Fritz Steiner. (53) Feb. 24.

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- The Garbage Crematory at Houston, Texas.* David M. Duller. (Paper read before the Convention of Health Officers of Texas.) (60) Mar.; (96) Mar. 30.
 Modern Sewage Disposal. F. W. Kerns. (60) Mar.
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 Standards of Ventilation. W. A. Evans. (Paper read before the Amer. Soc. of Heating and Ventilating Engrs.) (101) Mar. 4.
 Belfast Sewage Disposal: Royal Commission's Report and Recommendations. (104) Mar. 10.
 Standard Tests of Drain Tile and Sewer Pipe.* A. Marston. (Paper read before the Iowa Eng. Soc.) (86) Mar. 15.
 A Method for Determining the Parts Per Million of Dissolved Oxygen Consumed by Sewage and Sewage Effluents: Columbus Sewage Works. C. B. Hoover. (13) Mar. 16.
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 Reclamation Drainage in South Dakota.* A. B. McDaniel. (13) Mar. 30.

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- Proposed Standard Methods of Testing Drain Tile.* C. M. Powell. (Paper read before the Inter-State Tile Manufacturers Assoc.) (96) Mar. 30.
 Disintegration of Concrete in Sewage Disposal Tanks. (96) Mar. 30.
 Plumbing and Drainage Work on the Approaches Exterior to the New York Public Library.* (70) Apr.
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 Electrical Sewage Pumping in Great Britain.* James A. Seager, Assoc. M. Inst. C. E. (86) Apr. 5.
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- Two Reinforced Concrete Coal Pockets.* Myron S. Falk, M. Am. Soc. C. E. (54) Vol. 71.
 Rust—As Shown in the Removal of a Seventeen-Story Building. T. Kennard Thomson, M. Am. Soc. C. E. (54) Vol. 71.
 Timber Preservation, Its Development and Present Scope. Walter Buehler, M. Am. Soc. C. E. (54) Vol. 71.
 Earthquake Effects on Structures at Cartago, Costa Rica.* Charles W. Spofford. (Paper read before the Boston Soc. Civ. Engrs.) (1) Feb.
 Ligno-Concrete: Its Properties and Uses.* Frank J. Gray. (104) Feb. 24.
 The Application of Electrolytic Methods to Materials Used in the Paint and Varnish Industry. F. Mollivo Perkin. (Abstract of paper read before the Paint and Varnish Inst.) (73) Feb. 24.
 Alloy Steels for Railroad Use. Henry Southers. (25) Mar.
 Consequences of the Use of Mortar of Wrong Composition.* M. M. Van der Kloes. (67) Mar.
 Simplification of Formulae for Ferro-Concrete Beams with Single Reinforcement.* W. C. Unwin. (11) Mar. 3.
 Cost of School Building: Report of Departmental Committee. (104) Serial beginning Mar. 3.
 Recent Improvements in Holder Construction.* J. Alex. Mayers. (24) Mar. 6.
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 Reinforced-Concrete Street Subways in Chicago, U. S. A.* Ernest R. Matthews, A. M. Inst. C. E. (11) Mar. 10.
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 The Cause of Internal Corrosion of Hot Water Pipes.* M. J. Falkenburg, M. Am. Chem. Soc. (13) Mar. 23.
 Recent Investigations into the Nature of Cement at the Geophysical Laboratory, Carnegie Institution of Washington.* E. S. Shepherd. (Abstract from *Jour. of Industrial Chem.*) (13) Mar. 23.
 The Effect of Clay on Cement and Mortar. (14) Mar. 25.
 A Factory Building of Hollow Concrete Tile.* (14) Mar. 25.

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 Prevention of Corrosion in Metal Lath. C. W. Noble. (Paper read before the Canadian Cement Assoc.) (96) Mar. 30.
 An Experiment in Wood Preservation.* M. Meigs. (100) Apr.
 A General Formula for the Shearing Deflection of Beams of Arbitrary Cross-Section, Either Variable or Constant.* S. E. Slocum. (3) Apr.
 Notes on Creosoting.* C. M. Davis. (100) Apr.
 Steel Mine Shaft Construction.* R. B. Woodworth. (Abstract of paper read before Lake Superior Min. Inst.) (45) Apr.
 Rapid Construction of a Tall Building.* (14) Apr. 1.
 Asphaltic Oils as Wood Preservatives. Frank H. Cherrington. (Abstract of paper read before the Central Elec. Ry. Assoc.) (14) Apr. 1.
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 Prise d'Assaut des Derniers Rétranchements des Détracteurs du Ciment Armé.* (84) Feb.
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 Recherches sur la Dureté et la Fragilité des Aciers.* Grard. (93) Mar.
 Qualité Réfractaire des Briques "Dinas."* V. Groum-Grjimallo. (From *Journal de la Soc. Métallurgique russe.*) (93) Mar.
 Versuche mit Betonsäulen.* M. Rudeloff. (51) Serial beginning Sup. No. 5.
 Zeichnerische Behandlung des mehrfach statisch unbestimmten durchgehenden Bogenträgers mit zwei Kämpfergelenken.* Chr. Vlachos. (81) Pt. 2.
 Ueber das Lattenschwenken beim Nivellieren.* A. Buchholtz. (52) Serial beginning Feb. 15.
 Elektrischer Strom und Eisenbeton.* K. Alender. (80) Feb. 25.
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 Anwendung des Eisenbetons auf Silobauten.* E. Mörsch. (48) Serial beginning Mar. 4.
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 Zur Frage des Schlackenbetons.* A. Knaff. (50) Mar. 9.
 Vorschläge zur Förderung des Baues von billigen und hygienischen Kleinwohnungen in Oesterreich.* Georg Demski. (53) Mar. 10.
 Versuche über die Knickfestigkeit der Eisenbetonsäulen.* Max Ritter v. Thullie. (53) Mar. 10.
 Formverfahren für Hohlkörper mit herausnehmbaren und wieder verwendbaren Metallkernen sowie mit zerlegbaren Formkasten von W. Kurze. G. Barkhausen. (48) Mar. 25.

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- The Measurement of Two Primary Base Lines with Invar Tapes. William Bowie. (Paper read before the Phil. Soc. of Washington, D. C.) (13) Mar. 16.
 Recent Work with the Precise Level Instrument of the U. S. Coast and Geodetic Survey.* Hugh C. Mitchell. (13) Mar. 23.
 General Description of the Depression Position Plotter.* D. E. Hughes. (100) Apr.

Water Supply.

- Hydrometry as an Aid to the Successful Operation of an Irrigation System.* J. C. Stevens, Assoc. M. Am. Soc. C. E. (54) Vol. 71.
 The Tieton Canal.* E. G. Hopson, M. Am. Soc. C. E. (54) Vol. 71.
 The Problem of the High Masonry Dam.* Reginald Ryves, Assoc. M. Inst. C. E. (12) Serial beginning Feb. 24.
 A Municipal Pumping Plant Using Producer Gas. Raymond C. Allen. (60) Mar.
 Water Filtration for Industrial Purposes. Churchill Hungerford. (3) Mar.
 The Under-City Tunnel for Delivering Catskill Water to the Distribution Mains of New York.* (86) Mar. 8.
 The Azisobos Dam, Rangeley Lake Region, Maine.* Seth A. Moulton. (Abstract of paper read before the Nat. Assoc. of Cement Users.) (13) Mar. 9.
 The Toronto Filtration Plant.* Francis F. Longley. (14) Mar. 11; (13) Mar. 9.
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- A Theory of the Water Wave.* Morton F. Sanborn, Assoc. M. Am. Soc. C. E. (54) Vol. 71.
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